

PATENT COOPERATION TREATY
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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference C01F1576	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/JP2005/004037	International filing date (day/month/year) 02.03.2005	Priority date (day/month/year) 03.03.2004	

International Patent Classification (IPC) or national classification and IPC
INV. C12N15/82 A01H1/00

Applicant	NATIONAL UNIVERSTIY CORPORATON NARA INST.... et al
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<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <ul style="list-style-type: none"> a. <input checked="" type="checkbox"/> <i>sent to the applicant and to the International Bureau</i>) a total of 1 sheets, as follows: <ul style="list-style-type: none"> <input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> <i>(sent to the International Bureau only)</i> a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
<p>4. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application

Date of submission of the demand 27.12.2005	Date of completion of this report 23.05.2006
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Grosskopf, R Telephone No. +49 89 2399-8714



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Box No. I Basis of the report

1. With regard to the **language**, this report is based on
 - the international application in the language in which it was filed
 - a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - international search (under Rules 12.3(a) and 23.1(b))
 - publication of the international application (under Rule 12.4(a))
 - international preliminary examination (under Rules 55.2(a) and/or 55.3(a))
 2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-30 as originally filed

Sequence listings part of the description, Pages

1-14 as originally filed

Claims, Numbers

1-10 as originally filed

11-17 received on 02.05.2006 with letter of 27.04.2006

Drawings, Sheets

17-77 as originally filed

- a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. The amendments have resulted in the cancellation of:

- the description, pages
 - the claims, Nos.
 - the drawings, sheets/figs
 - the sequence listing (*specify*):
 - any table(s) related to sequence listing (*specify*):

4. This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- the description, pages
 - the claims, Nos.
 - the drawings, sheets/figs
 - the sequence listing (*specify*):
 - any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N) Yes: Claims 1-17

No: Claims

Inventive step (IS) Yes: Claims

No: Claims 1-17

Industrial applicability (IA) Yes: Claims 1-17

No: Claims

2. Citations and explanations (Rule 70.7):

see separate sheet

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Supplemental Box relating to Sequence Listing

Continuation of Box I, item 2:

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this report was established on the basis of:
 - a. type of material:
 - a sequence listing
 - table(s) related to the sequence listing
 - b. format of material:
 - on paper
 - in electronic form
 - c. time of filing/furnishing:
 - contained in the international application as filed
 - filed together with the international application in electronic form
 - furnished subsequently to this Authority for the purposes of search and/or examination
 - received by this Authority as an amendment* on
2. In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
3. Additional comments:

* If item 4 in Box No. I applies, the listing and/or table(s) related thereto, which form part of the basis of the report, may be marked "superseded."

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Re Item V.

- 1 Reference is made to the following documents:
 - D1 : EP 1 036 842 A (NARA INSTITUTE OF SCIENCE AND TECHNOLOGY) 20 September 2000 (2000-09-20)
 - D2 : MIYAGAWA YOSHIKO ET AL: "Overexpression of a cyanobacterial fructose-1,6-/sedoheptulose-1,7-bi sphosphatase in tobacco enhances photosynthesis and growth." NATURE BIOTECHNOLOGY, vol. 19, no. 10, October 2001 (2001-10), pages 965-969, XP002344765 ISSN: 1087-0156
 - D3 : MALIGA P: "TOWARDS PLASTID TRANSFORMATION IN FLOWERING PLANTS" TRENDS IN BIOTECHNOLOGY, ELSEVIER PUBLICATIONS, CAMBRIDGE, GB, vol. 11, no. 3, March 1993 (1993-03), pages 101-107, XP000892855 ISSN: 0167-7799
2. Both D1 and D2 describe the expression of FBPase and/or SBPase activities in order to enhance the photosynthesis activity by using a vector which allows the expression in chloroplasts.

Neither D1 nor D2 exactly use the same vector as used in the present application. Therefore novelty has to be acknowledged.

However, it is quite clear e.g. from D1 that the desired locus of expression is in the chloroplasts.

Therefore, it seems to be further obvious to replace the vectors used in D1 by vectors which allow the **specific** expression of proteins in chloroplasts (see e.g. D3).

Therefore, the use of one of these alternative and known vectors of D3 for the expression of a protein which should be expressed preferably in chloroplast is devoid of any inventive merit, unless the use of a specific vector shows unexpected or advantageous effects.

However, even in this case the claims had to be limited to said specific vector, i.e. a

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vector which contains all features of the vector used in the example.

In fact, any alleged unexpected properties (high expression etc.) must either be considered as being an inherent result of the general vector used (i.e. the obvious combination of the features of D1 and D3) or is not reflected in a proper manner by the present claims.

If one of the specific features chosen by the Applicant is responsible for the alleged unexpected results (e.g. the specific FBPase/SBPase gene or specific conditions during the expression etc.) this cannot constitute a basis for the at present general claims, but should be reflected by the introduction of said corresponding feature into the main claim and should be accompanied by comparative examples.

Finally, it should be added that a 2-fold increased expression (which again is at best due to the specific vectors used) cannot be regarded as being surprising in view of the up to 10000 (additional) copies of heterologous genes per cell. Admittedly there may be factors which do not (always) result in an increase of expression. However, the increased expression obtained, lies within the expected range.

[Replacement sheet of page 35]

11. The vector as claimed in any one of claims 1 to 10. Wherein the Rubisco subunit gene and the acetyl CoA carboxylase subunit gene are genes derived from tobacco, respectively.
12. a recombinant gene vector comprising an expression cassette containing a DNA fragment comprising a gene encoding a protein having FBPase and/or SBPase activities between a tobacco- derived Rubisco large subunit gene and the acetyl CoA carboxylase subunit gene, having a ribosome-binding site upstream of a translation initiation point of the DNA fragment, having a tobacco-derived promoter between a Rubisco large subunit gene and a ribosome-binding site, and having a tobacco-Derived terminator between the acetyl CoA carboxylase subunit gene and the DNA fragment.
13. A transformed chloroplasts characterized in that the vector according to any one of claims 1 to 12 is introduced into chloroplast.
14. A plant containing transformed chloroplasts according to claim 13.
15. The plant as claimed in claim 14, wherein the plant is tobacco.
16. (Amended) A plant having 2-fold or higher FBPase activity compared to the original one, characterized in that a FBPase/SBPase gene is introduced into chloroplast genome of higher plants and expressed using a chloroplast transformation technique.
17. (Newly added) A plant having two-fold or higher enhanced photosynthesis rate as compared with the wild variety, characterized in that a FBPase/SBPase gene is introduced into the chloroplast genome of higher plants using a vector according to any one of claims 1 to 12, followed by expression.